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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,760	09/08/2003	Salvatore J. Pace	30506/39552	7777

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EXAMINER	
VESTAL, REBECCA MICHELLE	
ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 05/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/657,760	PACE ET AL.	
	Examiner	Art Unit	
	R. Michelle Vestal	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 April 2005 and 08 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 June 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/12/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

S-0-0

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group I in the reply filed on April 11, 2005 is acknowledged. The traversal is on the ground(s) that 1) the inventions of Group I and Group II are not patentably distinct and 2) that search and examination of the entire application can be made without serious burden. This is not found persuasive because 1) the inventions are distinct for the reasons set forth in the previous office action, specifically, an optical detection apparatus and an electrochemical detection apparatus are materially different products for practicing the process of Group II, 2) the process of Group II has not been limited to any particular apparatus, including that of Group I, 3) Applicant argues limitations of the sensor element of Group I in the practice of the process of Group II which do not appear in the claims of Group II and 4) while a search for the inventions of Group I may overlap the search for the inventions of Group II, there is no reason to assume the searches would be co-extensive.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 17 recites the limitation "said free chlorine sensor" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 8 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by International Patent Application Publication Number WO 99/46587, referred to hereafter as "WO '587."

Regarding claim 1, WO '587 discloses a sensory apparatus comprising:

a substrate (page 6, line 11 or Fig. 1, **10**) comprising a plurality of sensors (page 6, line 12 or Fig. 1, **12**) to obtain an analyte profile (by measuring multiple parameters of a liquid sample, page 1, lines 10-11), the sensors including an ion-selective sensor (page 6, lines 16-18) capable of measuring ion content and a chlorine sensor (page 6, lines 16-18) capable of measuring chlorine content.

WO '587 discloses the limitations of claim 8, wherein the substrate further comprises one or both of a temperature sensor and a conductivity sensor (page 6, lines 16-18).

WO '587 discloses the limitations of claim 10, wherein said substrate further comprises one or more of an ammonia sensor, an oxygen sensor, and an oxidation/reduction potential sensor (page 6, lines 16-18).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent Number 5,120,421 to Glass et al. (Glass) in view of US Patent Application Number 2003/0111424 to Rosen et al. (Rosen).

Regarding claims 1, 2, 11 and 12, Glass discloses a sensory apparatus (Fig. 12) comprising a substrate (Fig. 12, **198**) comprising a plurality of sensors (Fig. 12, **200** and **206**) to obtain an analyte profile, the sensors including an ion-selective sensor (Fig. 12, **200**) capable of measuring ion content (Col. 2, line 53-Col. 3, line 1 and Col. 9, lines 59-62) and an analyzer (Fig. 2, **130**, Col. 1, lines 57-63 and Col. 4, lines 34-43). Glass discloses that the substrate comprises a silicon wafer (Fig. 5, **182** and Col. 9, lines 10-12) upon which said sensors (Fig. 5, **184**) are formed, said substrate further comprises an external periphery, including a plurality of bond pads on said periphery (Fig. 5, **188**) electrically connected to circuitry inside said periphery (Fig. 5, **186**). Glass discloses that the sensors and at least one bond pad are all on the same side of said substrate (Fig. 5), and said substrate is physically and electrically connected to a lead frame (Fig. 2, **150**), said lead frame having a plurality of sides and comprising an opening through which said sensors are exposed for use (Figs. 5, 6B or 6D); at least one exposed conductor area aligned for electrical contact with said bond pad (Figs. 5 and 10); a plurality of electrical terminators, at least one electrical terminator disposed on the same side of said lead frame as said exposed conductor area and electrically connected to said exposed conductor area (Figs. 5 and 10). Glass discloses the sensory apparatus is useful for detecting and measuring the amounts of elements and substances in solutions and the environment (Col. 1, lines 21-24).

Regarding the analyzer, Glass discloses that the analyte profile is compared to known profiles from a library of responses (Col. 1, lines 57-63) and that by means of

appropriate software, signals from the sensors are converted into values indicating the specific type and amount of electroactive elements or compounds present in the tested environment (Col. 4, lines 34-43). Absent evidence to the contrary, the analyzer of Glass is interpreted as being capable of correcting an analyte measurement based on the analyte profile.

Glass does not disclose that one of the sensors is a chlorine sensor.

Rosen teaches the use of a panel of sensors, including a chlorine sensor capable of measuring chlorine content, to monitor water quality in the environment (paragraph [0046], lines 1-4 and [0047], lines 1-16).

Glass and Rosen are analogous art because they are from a similar field of endeavor, that is the monitoring of environmental solution parameters.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include a chlorine sensor in the sensory apparatus of Glass because residual chlorine monitoring in environmental water supplies is conducted to ensure that chlorine levels remain within acceptable ranges for greenery and plant life, as taught by Rosen (paragraph [0046], lines 1-4 and [0048], lines 11-14]).

Therefore, it would have been obvious to combine Glass with Rosen to obtain the inventions as specified in claims 1, 2, 11 and 12.

Claims 3, 4, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glass and Rosen as applied to claim 1 above, and further in view of US Patent Number 4,713,165 to Conover et al. (Conover).

Regarding claims 3, 4, 13 and 14, Glass discloses a planar sensory apparatus with a plurality of sensors on a substrate (Fig. 12) useful for detecting and measuring the amounts of elements and substances in solutions and the environment (Col. 1, lines 21-24). Rosen teaches the use of a panel of sensors, including a chlorine sensor capable of measuring chlorine content and a hardness monitor capable of measuring calcium carbonate, to monitor water quality in the environment (paragraph [0046], lines 1-4 and [0047], lines 1-16 and [0056]).

Glass does not disclose expressly that the sensory apparatus comprises a calcium ion sensor or a carbonate ion sensor.

Conover teaches a planar sensory apparatus (Figs.1-3, **30**) comprising a calcium ion selective electrode and a carbonate ion selective electrode (Col. 32, lines 46-51) on a substrate.

Glass and Conover are analogous art because they are from the same field of endeavor, that is planar electrochemical sensor arrays.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include a calcium ion selective electrode and a carbonate ion selective electrode of Conover in the sensory apparatus of Glass because the measurement of calcium carbonate content in an environmental water sample provides an indication of the water hardness, which can either cause or be indicative of components which can cause harm and even death to vegetation such as grass and plants, as taught by Rosen (paragraph [0046], lines 20-23).

Therefore, it would have been obvious to combine Glass and Rosen with Conover to obtain the inventions as specified in claims 3, 4, 13 and 14.

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glass and Rosen as applied to claim 1 above, and further in view of US Patent Number 5,460,710 to Williams et al. (Williams).

Regarding claims 5 and 6, Glass discloses a planar sensory apparatus with a plurality of voltammetric and amperometric sensors (Col. 2, line 67-Col. 3, line 1) on a substrate useful for detecting and measuring the amounts of elements and substances in solutions and the environment (Col. 1, lines 21-24). Rosen teaches the use of a panel of in-line sensors, including a chlorine sensor capable of measuring the free and total chlorine content (paragraph [0060]), to monitor water quality in the environment (paragraph [0046], lines 1-4 and [0047], lines 1-16 and [0056]).

Glass does not disclose expressly that the chlorine sensor is configured to measure the free and total chlorine content or that the chlorine sensor is amperometric.

Williams teaches a planar sensory apparatus (Fig. 5, **50**) comprising an amperometric chlorine sensor configured to measure the free (Col. 4, lines 22-27) and total chlorine content (Col. 4, lines 20-21) in a water sample (Col. 1, lines 30-41).

Glass and Williams are analogous art because they are from the same field of endeavor, that is planar electrochemical sensor arrays.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include an amperometric chlorine configured to measure the free and total chlorine content of Williams in the sensory apparatus of Glass because the measurement of the free and total chlorine content in an environmental water sample

provides an indication of the water quality for determining when a dechlorination treatment is necessary or a shutdown determination if the readings deviate from an acceptable level, as taught by Rosen (paragraph [0046], lines 20-23 and [0047]). If the chlorine content is outside a predetermined acceptable range, harm or even death may come to vegetation such as grass and plants (paragraph [0046], lines 20-23).

Therefore, it would have been obvious to combine Glass and Rosen with Williams to obtain the inventions as specified in claims 5 and 6.

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glass and Rosen as applied to claim1 above, and further in view of Conover, US Patent Number 5,554,272 to Benco et al. (Benco) and optionally in view of Japanese Patent Application Publication Number JP 09-329577 (JP '577).

Regarding claims 7 and 8, Glass discloses a planar sensory apparatus with a plurality of voltammetric and amperometric sensors (Col. 2, line 67-Col. 3, line 1) including a hydrogen ion sensor (Col. 9, line 53) and a temperature sensor (Col. 9, lines 52-53) on a substrate useful for detecting and measuring the amounts of elements and substances in solutions and the environment (Col. 1, lines 21-24).

Regarding the analyzer, Glass discloses that the analyte profile is compared to known profiles from a library of responses (Col. 1, lines 57-63) and that by means of appropriate software, signals from the sensors are converted into values indicating the specific type and amount of electroactive elements or compounds present in the tested environment (Col. 4, lines 34-43). Absent evidence to the contrary, the analyzer of Glass is interpreted as being capable of using the signal from the temperature and/or conductivity sensor to correct one or more sensor measurements based on the analyte profile.

Glass does not disclose expressly that the sensory apparatus comprises a calcium ion sensor, a carbonate ion sensor, a bicarbonate ion sensor or a conductivity sensor.

Rosen teaches the use of a panel of in-line sensors, including a chlorine sensor (paragraph [0060]), a hardness sensor capable of measuring calcium carbonate (paragraph [0056], an alkalinity sensor capable of measuring bicarbonate (paragraph [0057]) and a conductivity sensor (paragraph [0058]), to monitor water quality in the environment (paragraph [0046], lines 1-4 and [0047], lines 1-16 and [0056]).

Conover teaches a planar sensory apparatus (Figs.1-3, **30**) comprising a calcium ion selective electrode and a carbonate ion selective electrode (Col. 32, lines 46-51) on a substrate.

Benco teaches a planar bicarbonate sensor (Fig. 1, **5**) which is capable of measuring the alkalinity of a water sample.

JP '577 teaches measuring the conductivity and pH to independently correct the residual level of chlorine measured in a water sample by a chlorine sensor (abstract).

Glass and Benco are analogous art because they are from the same field of endeavor, that is planar electrochemical sensors.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include a calcium ion sensor, a carbonate ion sensor, a bicarbonate ion sensor and a conductivity sensor in the sensory apparatus of Glass because these water quality characteristics may either cause or be indicative of components which cause harm or even death to vegetation such as grass and plants, as taught by Rosen (paragraph [0046], lines 15-23). Combining these sensors into a single sensor array provides a more compact structure for a handheld or in-line device monitoring of environmental conditions, as taught by Glass (Col. 1, lines 16-24). It would have been obvious to a person of ordinary skill in the art to use the conductivity or pH measurements to correct the measured residual chlorine of JP '577 in the sensory apparatus of Glass because the true residual chlorine content is dependent on the pH and the electrical conductivity of an environmental water sample, as taught by JP '577

(abstract). Correction of the measured response would, therefore, more accurately portray the residual chlorine level and prevent taking actions such as those taught by Rosen (paragraph [0047], lines 10-13) at inappropriate times.

Therefore, it would have been obvious to combine Glass and Rosen with Conover, Benco and, optionally, JP '577 to obtain the inventions as specified in claims 7-9.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Glass and Rosen as applied to claim 1 above, and further in view of US Patent Number 5,795,996 to Chang et al. (Chang).

Regarding claim 10, Glass discloses a planar sensory apparatus with a plurality of sensors on a substrate useful for detecting and measuring the amounts of elements and substances in solutions and the environment (Col. 1, lines 21-24). Rosen teaches the use of a panel of sensors, including a chlorine sensor capable of measuring chlorine content and a hardness monitor capable of measuring calcium carbonate and an alkalinity sensor (paragraph [0057]), to monitor water quality in the environment (paragraph [0046], lines 1-4 and [0047], lines 1-16 and [0056]).

Glass does not disclose expressly that the sensory apparatus comprises an oxidation/reduction potential sensor.

Chang teaches a sensory apparatus (Fig.1) comprising an oxidation/reduction potential sensor, a pH sensor, conductivity sensor and temperature sensor (Fig. 1). The oxidation/reduction potential sensor is used to control free chlorine content in water so as to maintain disinfection effects (Col. 1, lines 63-66 and Col. 3, lines 5-7).

Glass and Chang are analogous art because they are from the same field of endeavor, that is monitoring environmental solution parameters.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include an oxidation/reduction potential sensor of Chang in the sensory apparatus of Glass because this sensor can be used in the analysis of free chlorine content, which can either cause or be indicative of components which can cause harm and even death to vegetation such as grass and plants, as taught by Rosen (paragraph [0046], lines 20-23).

Therefore, it would have been obvious to combine Glass and Rosen with Chang to obtain the invention as specified in claim 10.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Glass in view of Rosen and Williams.

Regarding claim 15, Glass discloses a planar sensory apparatus, useful for detecting and measuring the amounts of elements and substances in solutions and the environment (Col. 1, lines 21-24), with a plurality of chemically selective sensors (Col. 9, lines 58-62) including an electrode and an ion-selective membrane on a substrate (Col. 14, line 48-Col. 15, line 12) and an analyzer unit (Fig. 2, **130**) connected to the sensor elements, wherein the sensor elements transmit signals to the analyzer and wherein the analyzer calculates an analyte profile based on said signals (Col. 1, lines 57-63 and Col. 10, lines 11-19).

Glass does not disclose expressly that one of the sensors is an amperometric chlorine sensor.

Rosen teaches the use of a panel of sensors, including a chlorine sensor capable of measuring chlorine content, to monitor water quality in the environment (paragraph [0046], lines 1-4 and [0047], lines 1-16).

Williams teaches a planar sensory apparatus (Fig. 5, **50**) comprising an amperometric chlorine sensor (Col. 1, lines 30-41) including a sensor element comprising a working electrode (Fig. 5, **50** or **52**) and a counter electrode (Fig. 5, **54**).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include an amperometric chlorine sensor including a sensor element comprising a working electrode and a counter electrode of Williams in the sensory apparatus of Glass because the measurement of the free and total chlorine content in an environmental water sample provides an indication of the water quality for determining when a dechlorination treatment is necessary or a shutdown determination if the readings deviate from an acceptable level, as taught by Rosen (paragraph [0046], lines 20-23 and [0047]). If the chlorine content is outside a predetermined acceptable range, harm or even death may come to vegetation such as grass and plants (paragraph [0046], lines 20-23). Combining these sensors into a single sensor array provides a more compact structure for a handheld or in-line device monitoring of environmental conditions, as taught by Glass (Col. 1, lines 16-24).

Therefore, it would have been obvious to combine Glass with Rosen and Williams to obtain the invention as specified in claim 15.

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glass in view of Rosen, Williams, Conover and Benco.

Regarding claims 16 and 17, Glass discloses a sensory apparatus (Fig. 12) comprising a substrate (Fig. 12, **198**) comprising a plurality of sensors (Fig. 12, **200** or **206**).

Glass does not disclose expressly that the sensors are a chlorine sensor, a pH sensor, a calcium ion sensor, a carbonate ion sensor, and a bicarbonate ion sensor.

Rosen teaches the use of a panel of sensors, including a chlorine sensor capable of measuring chlorine content, to monitor water quality in the environment (paragraph [0046], lines 1-4 and [0047], lines 1-16).

Williams teaches a planar sensory apparatus (Fig. 5, **50**) comprising an amperometric chlorine sensor (Col. 1, lines 30-41) including a sensor element comprising a working electrode (Fig. 5, **50** or **52**) and a counter electrode (Fig. 5, **54**) disposed on a substrate.

Conover teaches a planar sensory apparatus (Figs.1-3, **30**) comprising a hydrogen ion selective electrode (pH sensor), a calcium ion selective electrode and a carbonate ion selective electrode (Col. 32, lines 46-51) on a substrate.

Benco teaches a planar bicarbonate sensor (Fig. 1, **5**) which is a differential pCO_2 sensor comprising an unbuffered pH-sensitive electrode sensor and a buffered

selective electrode sensor (Col. 2, lines 19-33 and Col. 4, lines 6-25) and is capable of measuring the alkalinity of a water sample.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include an amperometric chlorine sensor including a sensor element comprising a working electrode and a counter electrode of Williams, a pH sensor, a calcium ion sensor and a carbonate ion sensor of Conover and a differential bicarbonate sensor of Benco in the sensory apparatus of Glass because the measurement of the free and total chlorine content in an environmental water sample provides an indication of the water quality for determining when a dechlorination treatment is necessary or a shutdown determination if the readings deviate from an acceptable level, as taught by Rosen (paragraph [0046], lines 20-23 and [0047]). Rosen also teaches that these water quality characteristics may either cause or be indicative of components which cause harm or even death to vegetation such as grass and plants (paragraph [0046], lines 15-23). Combining these sensors into a single sensor array provides a more compact structure for a handheld or in-line device monitoring of environmental conditions, as taught by Glass (Col. 1, lines 16-24).

Therefore, it would have been obvious to combine Glass with Rosen, Williams, Conover and Benco to obtain the inventions as specified in claims 16 and 17.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to R. Michelle Vestal whose telephone number is (571) 272-0524. The examiner can normally be reached on Monday-Friday, 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

rmv/rmv
May 18, 2005

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